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LETTER AND THE U S EPA REGION V COMMENTS REGARDING THE DRAFT SAMPLING AND ANALYSIS PLAN FOR SOURCE INVESTIGATION REVISION 1 NIROP FRIDLEY MN
04/24/2013
U S EPA REGION V CHICAGO , IL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

SR-6J

April 24, 2013

VIA ELECTRONIC MAIL AND CERTIFIED MAIL

Mr. Harvey Pokorny
Regional Project Manager
NAVFAC Midwest
201 Decatur Avenue, Building 1A
Great Lakes, IL 60088-2801

Re: EPA Comments on the Naval Industrial Reserve Ordinance Plant Fridley Draft Sampling and Analysis Plan for Source Investigation, Revision 1, dated March 2013

Dear Mr. Pokorny:

The United States Environmental Protection Agency (EPA) and its contractor, TechLaw Inc., have conducted a review of the Naval Industrial Reserve Ordnance Plant (NIROP) Fridley Draft Sampling and Analysis Plan for Source Investigation, Revision 1, dated March 2013 (SAP), for the NIROP, located in Fridley, Minnesota.

Several items that were agreed upon during the last partnering meeting on October 9-11, 2012 were not included in this SAP revision (i.e., a step-out approach or Triad method to determine boring locations). This information is detailed in our enclosed comments.

Please submit a revised SAP that incorporates all the enclosed comments and resolves the deficiencies within 45 days of receipt of this letter. EPA believes that it would be beneficial to have a meeting or conference call to discuss these comments and come to a consensus on a path forward prior to development of the revised SAP. If you have any questions or comments regarding this letter, please contact me at (312) 353-4150 or via email at desai.sheila@epa.gov.

Sincerely,

Sheila Desai

Sheila Desai
Remedial Project Manager

Enclosure

cc: Deepa de Alwis, MPCA (via email)
Nicole Goers, TechLaw Inc. (via email)
Karla Brasaemale, TechLaw Inc. (via email)

EPA COMMENTS ON THE NIROP FRIDLEY DRAFT SAMPLING AND ANALYSIS PLAN FOR SOURCE AREA INVESTIGATION REVISION 1 DATED MARCH 2013

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT FRIDLEY, MINNESOTA

GENERAL COMMENTS

1. The Naval Industrial Reserve Ordnance Plant (NIROP) Fridley Draft Sampling and Analysis Plan for Source Area Investigation, Revision 1, for the NIROP, Fridley Minnesota, dated March 2013 (the SAP) does not present the goals and objectives of the source area investigation consistently. Specifically, Section 10.1 (Introduction) of Worksheet #10 (Conceptual Site Model) includes a list of additional data needs that is not consistent with Section 10.2 (The environmental questions being asked) of Worksheet #10, or with Section 11.2 (Goals of the Study) of Worksheet #11 (Project Quality Objectives/Systematic Planning Process Statements). For example, the data needs in Section 10.1 do not include the goal of evaluating groundwater flow pathways, which is included in the second bullet point in Section 11.2. Similarly, the Section 10.2 question about the baseline concentrations of total organic carbon and iron in the soil at the source areas does not appear to be included in the data needs listed in Section 10.1 or the goals of the study in Section 11.2. There should be a one to one correspondence between the data needs, the environmental questions being asked, and the goals of the study. For example, the data needs should lead to the environmental questions, which in turn will be answered by the goals of the study. Then, the study goals should be used to provide the rationale for each sampling location and sample listed in Worksheet #18 (Location-Specific Sampling Methods/SOP Requirements Table). Revise the SAP to present consistently the goals and objectives of the source area investigation.

2. The SAP does not include decision rules or criteria for making decisions. For example, it is not sufficient to state that "vadose zone soil samples will be collected approximately every five feet for laboratory VOC [volatile organic compound] analysis" because decision rules and criteria for selecting the soil sample intervals that will be sent for laboratory analysis from the five-foot length of soil core are necessary. Similarly, there are no criteria for selecting screened intervals for monitoring wells. These decision rules and criteria are an essential part of the SAP. Due to the complexity of the decisions that must be made, decision trees may be necessary for some decisions. Revise the SAP to include project decision rules and criteria for making decisions for all project activities, including decision trees as necessary.

3. The SAP does not propose the use of any of the simple field screening tools that can be used to evaluate the presence of a dense nonaqueous phase liquid (DNAPL) in soil samples to help select samples for submission to the laboratory. Most proposed soil sample collection locations do not have adjacent membrane interface probe (MIP) borings, so it is unclear how specific sampling intervals will be selected. Also potential evidence of DNAPL from a MIP

boring may not be applicable in another boring a few feet away due to the nature of DNAPL migration in the subsurface. It should be recognized that DNAPL may not be observable using the naked eye after it diffuses into clay. Further, several intervals of a five-foot sample may result in elevated photoionization detector (PID) readings, so additional field screening tools may be necessary. For example, ribbon tests or hydrophobic dyes (i.e., in a jar test) could be used to evaluate whether a clay sample contains DNAPL. Revise the SAP to include use of a DNAPL field screening technology or explain, in detail, how samples will be selected for laboratory analysis when several intervals of a five-foot soil core appear to be suitable for laboratory analysis.

4. The SAP does not present a rationale for why the proposed sample numbers, types, locations and analyses will address the study questions (i.e., in Worksheet #17). Worksheet #17 (Sampling Design and Rationale) states that "the number of sample locations is considered adequate," but does not explain why the number of locations, analytes, sample depths, etc. are sufficient to meet the study goals. For example, Section 17.2.2 (Vertical Profile Borings and Shallow Vadose Zone Borings) of Worksheet #17 discusses the three borings (VP-1 through VP-3) that will be located in the vicinity of Area Of Concern (AOC) 17, but the three borings are in a northwest-southeast line and will not provide delineation of the lateral extent of groundwater contamination in the AOC-17 area. Without understanding the lateral extent of the groundwater plume, it is possible that the area with the highest concentrations will be missed. Similarly, several entries indicate that borings will "assess groundwater conditions" in the vicinity of the borings, but this is too vague to be considered a rationale for completion of these borings. The rationale should include the total number of samples to be collected for each medium, including quality control (QC) samples. Revise the SAP to provide a more detailed rationale that clarifies why the proposed sample number, types, locations and analyses (i.e., analytical methods as well as the analyte lists) are sufficient to meet study goals. Ensure this discussion includes the total number of samples to be collected from each medium and why this number of samples is sufficient.

5. The SAP does not include a sufficient Triad Approach or flexibility for moving MIP or vertical profile boring locations to delineate areas of interest/concern. Often MIP yields unanticipated results that indicate the need for additional delineation, so flexibility for adjusting locations should be included in the SAP. For example, the MIP-2 location may have high concentrations indicating that sampling is needed to the west of this location or the results of MIP-5 may indicate that samples are needed to the east of this location, but there are no sampling locations proposed in these areas and no flexibility to move locations to delineate the extent of contamination if necessary. The original scope of work, as agreed during the October 12, 2012 meeting, was that eight locations would be selected based on the results of the initial 20 locations, but this approach is not reflected in the SAP. Further, some of the proposed locations appear to be unnecessary, like VP-20, which is adjacent to well UC-69D; VP-25, which is near new extraction well AT-12; and, VP-26 which is near new extraction well AT-13 and monitoring wells 8-8S and MS-37S. At least five locations should be designated as flexible locations to facilitate delineating the extent of source areas using a Triad Approach. If this is not done, an additional investigation to delineate source areas likely will be necessary in the future. Revise the SAP to incorporate a Triad Approach for delineating the extent of source areas and designate at least five sample locations that can be

moved to delineate source areas.

6. Two boring locations are proposed for AOC 17. However, it is unclear how these borings are sufficient to locate or delineate the source area associated with AOC 17. Revise the SAP to explain how the AOC 17 source area can be located using only two boring locations.

7. The SAP states that the soil boring in each soil/groundwater pair will be completed first, then the groundwater boring will be completed. However, groundwater samples should be collected before the borehole for collection of soil samples is grouted so that the water quality is not impacted by the grout and VOCs are not lost due to heating as the cement grout cures. Alternatively, groundwater samples should not be collected until the grout has fully cured and heat generated by this process has dissipated.

8. The SAP does not include the laboratory-specific standard operating procedures (SOPs) and QC acceptance limits. Without this information, the adequacy of the laboratory methods cannot be evaluated, and the ability of the analyses to meet the criteria specified in the SAP cannot be verified. This laboratory-specific information is essential for determining if the study objectives can be met. Revise the SAP to provide the laboratory-specific SOPs and QC acceptance limits.

9. The analyses for the investigation derived waste (IDW) (e.g., Toxicity Characteristic Leaching Procedure [TCLP], pH, ignitability, and paint filter test) are not included in all worksheets. For example, Worksheet #23 (Analytical SOP References Table) does not identify the SOPs for these analyses, and Worksheet #30 (Analytical Services Table) does not identify the laboratory that will perform the IDW analyses. Revise the SAP to include the IDW analyses in these worksheets.

10. The number and sampling frequencies for QC samples are inconsistently presented in the SAP. The table for soil samples in Worksheet #12 (Field Quality Control Samples) indicates that trip blanks will be collected, and the second footnote for this table indicates equipment rinsate blanks may be collected. However, Worksheet #20 (Field Quality Control Sample Summary Table) does not include equipment rinsate blanks and trip blanks for soil samples. In addition, Worksheet #20 indicates that one equipment rinsate blank will be collected for every ten samples (for a total of 33), but Worksheet #17 (Sampling Design and Rational) (page WS 17-6) and the table for groundwater samples in Worksheet #12 indicate this frequency is one for every 20 samples and 17 equipment blanks are estimated in Worksheet #17. Lastly, Worksheet #18 (Location-Specific Sampling Methods/SOP Requirements Table) identifies different numbers of QC samples (e.g., seven soil field duplicates, five soil matrix spike/matrix spike duplicates [MS/MSDs], and one MS/MSD for groundwater from vertical profile borings) to be collected when compared to Worksheet #20 (e.g., five soil field duplicates, three soil MS/MSDs, and 17 vertical profile groundwater MS/MSDs). Revise the SAP to consistently indicate the numbers and frequencies for the collection of QC samples.

11. Section 27.1.1 (Sample Nomenclature) of Worksheet #27 (Sample Custody Requirements) and Worksheet #18 (Location-Specific Sampling Methods/SOP Requirements Table) indicate that "FD" will be added to the sample identification for field duplicates. However, it

is recommended that field duplicate samples not reference the location where they were collected in order to prevent potential bias during analysis. Revise the sample identification for the duplicate sample to provide a unique number to ensure that the field duplicate sample is submitted to the laboratory as a blind duplicate.

12. The data qualifiers listed in the last section of Worksheet #37 (Usability Assessment) on page WS 37-3 are inconsistent with the qualifiers defined in Worksheets #34–36, which do not indicate that M, H, Q, and L qualifiers will be used. Revise the SAP to clarify the qualifiers that will be used for data validation.

13. The SAP does not provide sufficient detail regarding the management of the project data and files. The SAP indicates data will be maintained and uploaded into two databases (i.e., NIRIS and the project database), but does not indicate that data will be verified once entered/uploaded. It is also unclear how validation qualifiers will be incorporated into the databases and data tables of the final report. In addition, the SAP should clearly define where and the length of time that all hard copy and electronic project files will be archived. Worksheet #29 (Project Documents and Records Table) states that laboratory data deliverables will be stored at a third party secure professional document storage firm long-term, but it is unclear what the term "long-term" means and if all files will be archived at this location. Revise the SAP to provide this information for the management of project data and files in accordance with Section 3.5 (Data Management Tasks) of the Uniform Federal Policy for Quality Assurance Project Plans EPA-505-B-04-900A, dated March 2005 (UFP QAPP).

14. The project personnel and their responsibilities presented in the SAP are incomplete. Worksheet #7 (Personnel Responsibilities Table) does not include the responsibilities for the Resolution Consultants Project Hydrogeologist and Project Engineer, but identifies a Data Manager who is not included in Worksheet #5. In addition, Worksheet #3 (Distribution List) indicates Ms. Stephanie Warino of Tetra Tech and Mr. Paul Walz of Bay West will receive the SAP, but it is not clear what roles these personnel will have in the current investigation. Furthermore, the SAP does not clarify if validation personnel will be independent from data generation. Revise the SAP to present all project personnel and their responsibilities. In addition, revise the SAP to clarify that personnel performing data validation are independent from the data generation activities.

SPECIFIC COMMENTS

1. **Executive Summary, Page i:** The last sentence of the second paragraph states, "Source material may contain residual mobile or non-mobile nonaqueous phase liquids (NAPL) or otherwise elevated concentrations of TCE [trichloroethene] and its degradation products that are generally in excess of 10 percent of the solubility limit." However, DNAPL is considered to be present at a concentration equivalent to 1 percent (%) of the solubility limit of the compound in groundwater. Since DNAPL would only be present in or have migrated from a source area, source material or area should be designated when 1% of the solubility limit is present in groundwater. Revise this sentence to define a source material at 1% of the

solubility limit of the compound in groundwater.

2. **Worksheet #2, Sampling and Analysis Plan Identifying Information, Pages 2-1 to 2-2:** This worksheet does not include the crosswalk table that identifies information required in each section and worksheet of the SAP and references to other documents (if necessary) found within these worksheets. Revise this worksheet to include the crosswalk table with references to other documents when the listed worksheets do not contain the required information.

3. **Worksheet #5, Project Organizational Chart, Page 5-1:** This chart lists two field subcontractors (i.e., Vironex and Mateco), but the contact information for the subcontractors is not provided. Additionally, the Utility Locator subcontractor is identified as TBD (to be determined). Further, Section 11.3 (Inputs to Problem Resolution) of Worksheet #11 (Project Quality Objectives/Systematic Planning Process Statements) indicates a registered land surveyor will survey the locations of the soil borings and monitoring wells, but the surveyor is not identified in Worksheet #5. Revise this chart to include the contact information for the subcontractors and ensure that all subcontractors are identified in the final version of the SAP.

4. **Worksheet #6, Communication Pathways, Page WS 6-1:** The table indicates regulatory agencies will be notified when issues arise, but does not provide further information for the type of issues that will necessitate this notification. Revise the table to specify that the EPA and regulatory agencies will be notified when significant corrective actions or changes to the SAP occur.

5. **Worksheet #9, Project Scoping Session Participants Sheet, Pages WS 9-1 to WS 9-4:** This worksheet indicates that five project scoping sessions were held, but the information for who participated and the consensus decisions made is only provided for the October 2012 session, and action items are listed for the October 2012 and January 2013 sessions. Revise this worksheet to provide the participant, consensus decisions, and action item information for all scoping sessions as appropriate (e.g., separate tables completed for each scoping session).

6. **Worksheet #10, Conceptual Site Model, Page WS-1:** According to the Unified Federal Programs Quality Assurance Project Plan Workbook (UFP/QAPP Workbook), page 14, Worksheet #10 should be titled "Problem Definition," not "Conceptual Site Model." The Table of Contents also indicates that the title of Worksheet #10 should be "Problem Definition." Also, this worksheet is missing the sections "The problem to be addressed by the project," "A synopsis of secondary data or information from site reports," and "Project decision conditions ("If…, then…" statements)." It is noted that some of the information provided in Section 10.3 (Observations from any site reconnaissance reports) is a synopsis of secondary data, but additional information should be added. An example of this additional information includes a discussion from the October 12, 2012 meeting associated with the 1997 soil samples which indicated that VOCs were not detected in sandy samples and were only detected in samples collected from fine-grained soils/clay. Revise the title of Worksheet

#10 and include the missing sections.

7. **Worksheet #10, Conceptual Site Model, Section 10.1, Introduction, Page WS10-1:** The work proposed in the SAP is unlikely to be sufficient to meet the first data need, "Evaluate the nature and location of any source material." For example, the two borings proposed in AOC 17 are not likely to be sufficient to locate the source area or to fully evaluate the nature of source materials in this area. This data need should be revised so that the work proposed in the SAP can meet the data need or the SAP should acknowledge the potential need for follow-on investigations. Revise the first data need in Section 10.1 so that the work proposed in this SAP can meet the need or acknowledge the potential for follow-on investigations in the text.

   Similarly, the third data need cannot be met by the work proposed in this SAP because soil will not be collected for bench-scale testing. The third data need is stated as "Evaluate if source area remediation would accelerate the cleanup timeframe." Bench-scale testing of source area soil and groundwater should be proposed in the SAP or this data need should be deleted. Revise the SAP to include bench-scale testing or delete the third data need.

8. **Worksheet #10, Conceptual Site Model, Section 10.2, The environmental questions being asked, Page WS10-2:** The SAP should not include first question (i.e.,"What constitutes a source area or source material?") because these definitions are needed to define the criteria that should be used in the project decision conditions/decision rules. For example, if it is decided that concentrations indicative of the presence of a DNAPL, generally 1 percent (%) of the solubility limit of a compound or evidence of DNAPL using a dye or equivalent test, defines a source area, then the decision rules should be written to reflect this approach. Further, the question about what constitutes a source material is vague and should be explained. It is recommended that agreement on these definitions be obtained during a meeting or conference call with the Navy and Regulatory Agencies so that the SAP can be rewritten accordingly. Propose how source areas and source materials be defined and consult with the Navy and Regulatory Agencies to obtain agreement. Then, revise the SAP to include these definitions and criteria in project decision conditions/decision questions.

   In addition, the work proposed in this SAP is not sufficient to address the fourth question, "Are there source areas not located on the NIROP property may [*sic*] be contributing to groundwater impacts on-site?" The work proposed in the SAP does not appear adequate to delineate contamination that may be migrating onto the site from the north or northwest and does not appear to be sufficient to delineate contamination that may be migrating from the BAE areas of the site. As a result, this question should be deleted or revised to reflect the areas that will be delineated by the work proposed in this SAP. Delete or revise the fourth question to reflect data that will be obtained by the work proposed in this SAP.

   Finally, it is not clear how the second part of the sixth question can be answered by the data that will be obtained during this investigation. The sixth question asks, "What are the general soil types in the subsurface and flow pathways for TCE in groundwater?" It will not be possible to evaluate the flow pathways for TCE in groundwater because of the limited number of borings and wells and because tracer tests are not proposed. The second half of

the sixth question should be deleted or revised to reflect the limited data that will be obtained by this investigation. Alternatively, the SAP could be revised to propose tracer tests with additional borings to evaluate where the tracer is present. Delete or revise the second half of the sixth question to reflect the data that will be obtained during this investigation.

9. **Worksheet #10, Conceptual Site Model, Section 10.5.2, Analysis of Soil and Groundwater in Vertical Profile Borings, Page WS 10-6:** The last paragraph on page 10-6 states that soil samples "will enable characterization of … aquitard conditions," but grain size and permeability testing is not included in the scope of work, so it will not be possible to evaluate whether fine-grained units have the characteristics of an aquitard or an aquiclude. Further, the proposed number of borings may not be sufficient to evaluate whether fine-grained units are continuous. Revise the SAP to include permeability testing or delete the statement about characterizing aquitard conditions.

10. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements:** Worksheet #11 does not include answers to the questions listed on page 15 of the UFP-QAPP Workbook. For example, some of the questions that should be answered include, "Who will use the data?," "What will the data be used for?," and "How 'good' do the data need to be in order to support the environmental decisions?" Revise Worksheet #11 to include the answers to these questions.

11. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Section 11.3, Inputs to Problem Resolution, Page WS 11-3, Bullet 3; Worksheet #14: Summary of Project Tasks, Section 14.2.1, Field Tasks, Page WS 14-3; and Worksheet #17: Sampling Design and Rationale, Section 17.4.1 Soil Sample Collection from Monitoring Well Borings, Page WS 17-7:** It is unclear if eight soil samples will be collected from each monitoring well borehole or if eight samples will be collected from the three monitoring well boreholes (i.e., two or three samples per boring). Revise the SAP to clarify how many samples will be collected from each monitoring well borehole.

12. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Section 11.3, Inputs to Problem Resolution, Page WS 11-3, Bullet 4:** The text states that groundwater sample results "will be used to correlate the accuracy of the MIP and vertical profile boring results," but samples collected from monitoring wells generally have lower concentrations than MIP or grab groundwater samples. Since the MIP provides a continuous profile of VOC concentrations and represents concentrations in groundwater and sorbed to soil particles, the SAP should explain how data from monitoring wells "will be used to correlate the accuracy of the MIP" and provide criteria for this evaluation. Revise the SAP to explain, in detail, how data from monitoring wells will be used to correlate the accuracy of the MIP and provide criteria for this evaluation.

13. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Section 11.6, Performance or Acceptance Criteria, Page WS 11-5:** This section indicates that three contingency borings may be needed "to determine the location and depth of the three monitoring wells," but these contingency borings are not discussed in Section 11.3 (Inputs to Problem Resolution) and are not consistently presented throughout the SAP. In

addition, criteria that will be used to determine if these contingency borings are necessary and details about the type of data and samples that will be collected from these borings are not provided. Revise the SAP to fully incorporate the three contingency borings into all relevant Worksheets.

14. **Worksheet #11, Section 11.5, Analytical Approach, Page WS 11-5:** The Minnesota Pollution Control Agency Industrial Soil Reference Values (SRVs) are listed as the project action levels (PALs) for soil, but the SAP does not indicate why industrial levels were selected. Revise this section to provide a rationale for using Industrial SRVs as soil PALs.

15. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Section 11.6, Performance or Acceptance Criteria, Page WS 11-8:** The text states that the PAL for vinyl chloride in water is less than the laboratory limit of detection (LOD) and that this LOD "is considered adequate for the project needs," but does not explain why this is the case or how vinyl chloride data will be interpreted. Revise the SAP to explain, in detail, why a LOD for vinyl chloride that is greater than the PAL is acceptable.

16. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Section 11.8, Reporting, Page WS 11-9:** The list of report contents does not specify the type of site figures that will be included. These figures should include a groundwater elevation contour map for the intermediate zone and plan view maps, including a cross-section location figure and maps that depict contaminant concentrations (e.g., spider diagrams or maps that depict contaminant concentrations at discrete depth intervals). Revise the list of report contents or text to specify the types of site figures that will be included in the report.

17. **Worksheet #12, Field Quality Control Samples, Page WS 12-1:** The table "Measurement Performance Criteria Table — Field QC Samples for Groundwater Samples" indicates that groundwater field duplicate samples will be collected from a consistent interval rather than at all depths collected for a given boring, but a rationale is not provided. Revise the SAP to provide a rationale for collecting field duplicates at only one depth.

18. **Worksheet #12, Field Quality Control Samples, Page WS 12-2:** The second footnote for the table "Measurement Performance Criteria Table — Field QC Samples for Soil Samples" indicates equipment rinsate blanks may be collected if decontamination is required. However, this table does not include the measurement performance criteria and frequency for equipment rinsate blanks. Revise this table to include equipment rinsate blanks.

19. **Worksheet #13, Sources of Secondary Data Criteria and Limitations Table, Page WS 13-1:** This table is not consistent with the discussion of previous investigations in Section 10.3 (Observations from any site reconnaissance reports) of Worksheet #10 (Conceptual Site Model). Section 10.3 includes a 2002 OU-3 Remedial Investigation, a 2011 Annual Groundwater Monitoring Report, and a Technical Memoramdum with groundwater sampling results from 2012. It also indicates that previous Annual Monitoring Reports (AMRs) have documented the general extent of the groundwater plume. Revise Worksheet #13 to include

these AMRs and any other applicable documents with relevant site information, and ensure any limitations on the data use are discussed.

20. **Worksheet #14, Summary of Project Tasks, Section 14.2.1, Field Tasks, Page WS 14-3; Procedure 3-12, Monitoring Well Installation, and Procedure 3-21, Surface and Subsurface Soil Sampling Procedures:** Worksheet #14 does not include sufficient information to complete the field work because the standard operating procedures in Appendix B (Resolution Consultants Standard Operating Procedures and Field Forms) are generic in nature. Site-specific details and criteria necessary to complete the field work must be included in Worksheet #14; it is not sufficient to rely on "professional judgment." For example, for monitoring well installation, the borehole diameter, well diameter, screen type, screen length, sand pack type, cement/bentonite grout mixture percentages, etc. are not specified and criteria for selecting these well completion requirements are not included in the SAP or Procedure 3-12 (Monitoring Well Installation) in Appendix B (Resolution Consultants Standard Operating Procedures and Field Forms). While some of these requirements are included in Worksheet #17 (Sampling Design and Rationale), this information should be presented in Worksheet #14 and justification for the sandpack, screen length, well diameter, and slot sizes is not provided. Other requirements, such as the percentage of cement and bentonite in grout, are not provided in the SAP. Similarly, a detailed procedure and criteria for selecting soil and groundwater sample depths/intervals for submission to the analytical laboratory are not provided in the SAP or Procedure 3-21 (Surface and Subsurface Soil Sampling Procedures) of Appendix B (Resolution Consultants Standard Operating Procedures and Field Forms). In addition, the soil sampling procedure in Worksheet #14 should specify that soil samples will only be collected from fine-grained units (i.e., clays or clayey silts). Worksheet #14 should also specify that groundwater samples will only be collected from coarser units (i.e., sands or gravels). Revise Worksheet #14 to include detailed procedures, requirements, and criteria for completion of the field work, including, but not limited to, monitoring well construction specifications, groundwater sampling criteria, and soil sampling criteria.

21. **Worksheet #14, Section 14.4.4 Data Review Tasks, Page WS 14-5:** This section indicates 10% of the data will undergo a Level IV data validation and the remaining 90% will be validated as Level III, but does not discuss how the 10% of the data will be selected. Revise the text to discuss how 10% of the data to be validated at Level IV will be selected (e.g., randomly).

22. **Worksheet #16, Project/Timeline Table, Pages WS 16-1 to WS 16-2:** The schedule does not include validation of analytical results. Revise this worksheet to indicate when analytical data packages will be validated, and ensure that results will be validated before any decisions based on the data are made.

23. **Worksheet #17, Sampling Design and Rationale:** The sampling procedures and details included in Worksheet #17 (e.g., pages WS 17-5 and 17-6) are not rationale or sampling design; these procedures should be moved to Worksheet #14 (Summary of Project Tasks). Revise the SAP to move sampling procedures to Worksheet #14.

24. **Worksheet #17, Sampling Design and Rationale, Section 17.1, Sampling Approach, Item 2, Page WS 17-1 and Section 17.3, Second Mobilization – Contingency Vertical Profile Borings, Page WS 17-7:** The purpose of the three contingency vertical profile borings as stated in Worksheet #17 is inconsistent with the purpose of these borings stated in Worksheet #11 (Project Quality Objectives/Systematic Planning Process Statements). Section 11.6 (Performance or Acceptance Criteria) of Worksheet #11 states that the purpose of the three contingency borings is "to determine the location and depth of the three monitoring wells," but Worksheet #17 indicates that these borings are to address data gaps in general. Revise the SAP to resolve the inconsistency regarding the purpose of the three contingency borings.

25. **Worksheet #17, Sampling Design and Rationale, Section 17.2.2.2, Vertical Profile Borings and Shallow Vadose Zone Borings, Page WS 17-4:** The bulleted statements that VP 15 and VP 16 and VP-22 through VP-27 will "assess the groundwater contaminant flow pathways to the extraction wells," presents conditions that cannot be met given the work proposed in the SAP. Groundwater flow pathways cannot be assessed from lithologic logs, soil samples, and groundwater samples collected from borings; additional information such as the piezometric head, permeability, and transmissivity of each individual lithologic unit, hydraulic gradient, aquifer tests, and multiple tracer studies are typically required to evaluate groundwater flow pathways. To evaluate where TCE is being transported would also require a groundwater sample from each coarse-grained unit and microsampling in each fine-grained unit in each boring, but it is not clear that sufficient samples per boring will be collected to obtain these data. A similar statement is presented in the last sentence on page WS 17-4. Delete the quoted statement for locations VP 15 and VP-16, and VP-22 through VP-27, and the statement about assessing the flow pathways for TCE in groundwater in the last sentence on page 17-4, and provide a rationale for these locations or revise the SAP to include the detailed studies that are necessary to evaluate groundwater flow pathways.

26. **Worksheet #17, Sampling Design and Rationale, Section 17.2.2.2, Vertical Profile Borings and Shallow Vadose Zone Borings, Page WS 17-5:** The text states that a PID may be used to evaluate areas targeted for sampling, but it is not clear that a PID would respond to groundwater samples with low concentrations of VOCs. Note that soil samples will not be collected from the borings used for groundwater sampling and that it may not be possible to precisely locate thin intervals in these borings. An alternate method may be necessary. Revise the text to explain, in detail, how the PID will be used to select groundwater sample intervals or propose an alternate method for selecting groundwater sampling intervals.

27. **Worksheet #17, Sampling Design and Rationale, Section 17.2.2.2, Vertical Profile Borings and Shallow Vadose Zone Borings, Page WS 17-6:** The groundwater sampling procedures outlined on page 17-6 are not sufficient to minimize the potential for cross-contamination. For example, the temporary screen will not be decontaminated between sampling intervals unless it is pulled through a thick fine-grained unit; this can introduce cross-contamination. To minimize the potential for cross-contamination, groundwater samples should be collected from the water table downward and the drill string should be pulled so that the tooling and well screen can be decontaminated between each sample. Note

that if this is done, the screen will not be exposed as the tool is pushed to the next sampling interval, so it will not be contaminated. Revise the groundwater sampling procedure to require sampling from the water table downward and decontamination of the tooling and temporary screen after each sample is collected.

28. **Worksheet #17, Sampling Design and Rationale, Section 17.5, Fourth Mobilization – Groundwater Sampling, Page WS 17-9:** The text states that "Sampling Equipment will be decontaminated between monitoring well locations," but some equipment should be discarded (e.g., single use bailers should be required, drop tubing for sampling should be discarded because it cannot be decontaminated, etc.). Also, it is unclear if a bladder pump will be installed in each well or if a single pump will be removed and decontaminated between wells. Revise the text to specify the equipment that will be decontaminated and reused, and the equipment that will be discarded after each well is sampled.

29. **Worksheet #18, Location-Specific Sampling Methods/SOP Requirements Table:** The Location-Specific Sampling Methods/SOP Requirements Table is missing the column "Rationale for Sampling Location," per page 22 of the UFP-QAPP Workbook. The rationale related to the study goals and data needs for the project for each sampling location should be provided. Revise Worksheet #18 to include the rationale for each sampling location and relate this rationale to the study goals and data needs for the project.

30. **Worksheet #19, Analytical Methods/SOP Requirements Table, Page WS 19-1:** Worksheet #19 indicates that soil samples for VOC analyses will be collected using one glass container with a methanol preservative, but Encore® samplers are preferred for VOC sampling Revise this worksheet to utilize Encore® samplers or, alternatively, ensure the SAP is consistent with the SOP 3-21 in Appendix B which indicates that each sample for VOC analyses will be collected using three 40 milliliter (mL) vials with preservatives for low level and high level concentrations.

31. **Worksheet #21, Project Sampling SOP References Table, Page WS 21-2:** The SOP Reference Number and revision information for the Geoprobe® Screen Point 16 Groundwater Sampler and Membrane Interface Probe SOP are not consistent with the SOP provided in Appendix D. The SOP in Appendix D is indicated to be Technical Bulletin No. MK3142, prepared November 2006. However, Worksheet #21 lists Technical Bulletin No. MK3137MK3010 and presents conflicting revision information (e.g., "Revision 0, March 2007" and "Prepared May 2003, Revised June 2009"). Revise the SAP to resolve these discrepancies.

32. **Worksheet #22, Field Equipment Calibration, Maintenance, Testing, and Inspection Table, Page WS 22-1:** This worksheet indicates that acceptance criteria for the MIP are provided by the manufacturers' guidance. However, the Manufacturer's Guidance Manuals are not provided for any instrument. In addition, the subcontractor's SOP in Appendix D for the MIP are not referenced by Worksheet #22. Revise this worksheet to include manufacturer's manuals and to reference the MIP SOP.

33. **Worksheet #24, Analytical Instrument Calibration Table, Pages WS 24-1 to WS 24-2:** This table is missing the tuning requirements for analyses by Method 8260B and the interference check solution for Method 6010C. Revise Worksheet #24 to include these calibration procedures.

34. **Worksheet #25, Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table, Page WS 25-1:** This table indicates inductively coupled plasma (ICP)-mass spectrometry will be used, but the proposed analytical method (Method 6010C) utilizes ICP-atomic emission spectrometry. Revise this table to resolve this discrepancy

35. **Worksheet #28, Laboratory QC Samples Table, Page WS 28-2:** This table indicates that a post digest spike (PDS) will be performed when a serial dilution fails or all analyte concentrations are less than 50 times the LOD, and the acceptance criteria for the PDS recovery are 75 to 125%. However, the table does not indicate that the PDS will be performed when a matrix spike does not meet acceptance criteria. Method 6010C indicates that a PDS should be performed when MS/MSD recoveries are unacceptable, and the acceptance criteria for the PDS should be 80 to 120%. Revise this table to indicate that a PDS will also be analyzed whenever MS/MSDs do not meet acceptance limits, and to identify the percent recovery acceptance limits for the PDS as 80 to 120%.

36. **Worksheet #31, Planned Project Assessments Table, Page WS 31-1:** This table does not include an audit of the laboratory performing the analyses for this investigation. It is recommended that audits are conducted to ensure the laboratory can produce data of sufficient quality. In addition, audit checklists for the planned assessments are not provided or referenced. Revise the SAP to include a laboratory audit or to provide justification for the lack of laboratory audits if they will not be conducted. Also, revise the SAP to provide audit checklists indicating the items to be evaluated for the planned assessments.

37. **Worksheets #34-36, Data Verification and Validation Process Table, Pages WS 34 – 36-3:** In Data Review Input step "Validation Groundwater and Soil VOCs", it states what worksheets and guidance documents would potentially be used for validation of data, including the *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (2008)*. The National Functional Guidelines (NFG) are indicated to be utilized to apply qualifiers to the data "to the extent possible". What is the protocol to be followed if the NFG cannot be properly utilized to qualify the data, and how would this be applied instead of the NFG? Please specify.

38. **Worksheets #34-36, Data Verification and Validation (Steps I and IIa/IIb) Process Table, Pages WS 34 – 36-3:** This table indicates that the criteria to be used for validation of the VOC data include Method 8260B specific criteria, data quality indicators in the Department of Defense Quality Systems Manual (QSM), and the criteria presented in Worksheets #12, #19, and #28 of this SAP. Since multiple criteria are referenced for the data validation procedures, data validation checklists describing how samples will be qualified (e.g., when samples will be qualified estimated/rejected) should be provided for each analytical method. Revise the SAP to provide data validation checklists.

39. **Worksheet #37, Usability Assessment, Pages WS 37-1 to WS 37-3:** This worksheet does not indicate that overall trends to the data will be evaluated and discussed in the Data Quality Assessment (DQA) that is included in the project report. The DQA should include a detailed description of how the items in Worksheet #37 were evaluated with sufficient information to support the data usability conclusions. Revise the SAP to indicate that the DQA included in the project report will include this information.

40. **Worksheet #37, Usability Assessment, Pages WS 37-1:** Completeness is discussed in this worksheet, but field and laboratory completeness goals are not established. Revise this worksheet to provide completeness goals for the project.

41. **Worksheet #37, Usability Assessment, Page WS 37-3:** This worksheet states that there may be reason to use rejected data in a weight of evidence argument, especially when the rejected data supplements data that have not been rejected. However, rejected data are not quantifiable and should not be used for decision making. Revise the SAP to indicate that rejected data will not be used for making decisions.

42. **Appendix B, Resolution Consultants Field Standard Operating Procedures and Field Forms, Procedure 3-02 (Logbooks), Page 3 of 5:** The SOP for logbooks does not include a procedure to address unused space in the logbooks. For example, the SOP does not indicate that a single diagonal line should be drawn through blank or unused portions of the pages, then initialed and dated. Revise the Logbooks SOP to include a procedure to address the unused space in a logbook.

43. **Appendix B, Resolution Consultants Field Standard Operating Procedures and Field Forms, Procedure 3-04 (Sample Handling, Storage, and Shipping), Page 2 of 15:** The SOP does not require sufficient headspace (ullage) in all bottles (except VOA containers) to compensate for changes in pressure and temperature during shipping (approximately 10 percent of the container volume). Revise the SOP to include this requirement to ensure the sampling containers are not impacted by changes in pressure and temperature during shipping.

44. **Appendix B, Resolution Consultants Standard Operating Procedures and Field Forms, Procedure 3-14 (Monitoring Well Sampling), Section 8.2.7 (Sample Handling and Preservation), Page 11 of 15:** The sampling procedure does not specify that if bubbles are detected in a volatile organic analyte (VOA) vial, the vial should be discarded and a new pre-preserved VOA vial should be used to collect the VOC sample. It is not acceptable to open and refill VOA vials because VOCs could be lost and preservative may be diluted. If after several attempts, a bubble-free sample cannot be collected, the VOC sample should be collected in an unpreserved VOA vial. Note that this may change the holding time for this sample. Revise Procedure 3-14 to specify that VOA vials must be discarded if bubbles are observed in the sample and a new preserved VOA vial be used to collect the sample. In addition, revise the procedure to address the condition where bubbles are observed in a VOA vial after several attempts have been made to collect the sample (i.e., using an unpreserved VOA vial), including revising the SAP to include the holding time for unpreserved VOA samples.

MINOR COMMENTS

1. **Worksheet #4, Project Personnel Sign-Off Sheet, Page WS 4-1:** The telephone number listed in this worksheet for the Field Operations Leader and Site Safety Officer Dan Phelps is different than the number listed in Worksheets #3 (Distribution List), #5 (Project Organizational Chart), and #7 (Personnel Responsibilities Table). Revise the SAP to resolve this discrepancy and/or clarify the difference between the numbers.

2. **Worksheet #17, Sampling Design and Rationale, Section 17.2.2.2, Vertical Profile Borings and Shallow Vadose Zone Borings, Page WS 17-6:** The word "aquitard" should not be used to describe fine-grained units regardless of thickness. Aquitards have specific properties (e.g., very low permeability and transmissivity, lack of root holes and other high permeability features, lateral continuity and extent, etc.), so the word "aquitard" should not be used unless it can be demonstrated that the specific lithologic unit meets all of the criteria for an aquitard. It is recommended that the word "unit" be used. Delete the word aquitard from Worksheet #17 and replace it with a less specific word unless it can be demonstrated that the specific unit meets the criteria for an aquitard. Also, revise the SAP to delete all occurrences of the word "aquitard."

3. **Worksheet #24, Analytical Instrument Calibration Table, Page WS 24-1:** The acceptance criterion for the relative retention time (RRT) evaluation is for the RRT of each target analyte to be within 0.006 RRT units, but Method 8260B, Section 7.3.7, Evaluation of Retention Times, indicates this should be within 0.06 RRT units. Revise this table to identify the RRT evaluation acceptance criterion as target analytes within